fw

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/749,335	12/31/2003	Sanjay Nichani	C03-001	8225

23459 7590 06/14/2006

ARTHUR J. O'DEA
LEGAL DEPARTMENT
COGNEX CORPORATION
ONE VISION DRIVE
NATICK, MA 01760-2077

EXAMINER	
KUHN, JORDAN M	
ART UNIT	**PAPER NUMBER**
2624	

DATE MAILED: 06/14/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)
	10/749,335	NICHANI ET AL.
	Examiner	**Art Unit**
	Jordan Kuhn	2624

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *31 December 2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-17* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-17* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *01 July 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *8/9/04,12/1/04*, 8/17/05, 9/30/05

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application (PTO-152)

6) ☐ Other: _____.

DETAILED ACTION

Double Patenting

1. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

2. Claims 1, 2, 10, and 16 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1, 11, 14, and 16 of copending Application No. 10/388,925. Although the conflicting claims are not identical, they are not patentably distinct from each other for the following reasons:

Claim 1 of the present application discloses a method for controlling an object. Claim 1 of Application No. 10/388,925 discloses the same method, but for specifically controlling a door. It would be extremely obvious to modify the method of controlling a door to control the motion of any object, such as a conveyor belt, for the purpose of turning on the conveyor belt when an object is present on its surface.

Claim 2 of the present application further limits claim 1 with a method for computing 3D features that is identical to claim 11 of Application No. 10/388,925.

Claim 10 of the present application further limits claim 1 with a method for filtering that is identical to claim 16 of Application No. 10/388,925.

Claim 16 provides determining heights of points relative to a ground plane and clustering the points in 3D space to generate objects, which is equivalent to claim 14 of Application No. 10/388.925.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

4. Claim 1 is rejected under 35 U.S.C. 102(a) as being anticipated by Schatz et al. (US Patent No 6,297,844), hereinafter referenced as Schatz.

Regarding **claim 1**, Schatz discloses a video safety curtain comprising capturing a stereo image of an area to be monitored, which reads on "acquiring a stereo image of said viewed space wherein said stereo image comprises an image set", generating 3D features from the stereo image, which reads on "computing a set of 3D features from said stereo image", filtering the 3D features by comparing the 3D features to reference data, which reads on "filtering from said set

of 3D features to generate a set of filtered 3D features", calculating trajectories of the filtered 3D features, which reads on "computing a trajectory of said set of filtered 3D features", and generating a control signal that triggers an alarm based on the trajectory, wherein the alarm could control an objects motion, which reads on "generating a control signal influencing said objects motion in response to said trajectory", as disclosed at column 8 lines 28-52 and column 10 lines 25-39.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claims 14 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Schatz.

Regarding **claim 14**, Schatz discloses everything as applied above (see claim 1). Schatz fails to specifically disclose wherein calculating a trajectory comprises the step of correlating segmented features in a first frame with features around an expected object position in a following frame. However, the examiner take OFFICIAL NOTICE (see MPEP 2144.03) that it was extremely well known in the art to provide for wherein calculating a trajectory comprises the step of correlating segmented features in a first frame with features around an expected object position in a following frame, and would therefore be obvious to modify Schatz by providing this method for trajectory calculation, for the purpose of increasing search speed when tracking an object from frame to frame.

Regarding **claim 16**, Schatz discloses everything as applied above in claim 1. Schatz further discloses clustering 3D features into cluster-clouds in order to segment distinct 3D objects, which reads on "clustering said features having a height above said ground plane in 3D space to generate objects", since it is obvious that clusters of features acquired in 3D space, as taught by Schatz, have a height above the ground plane, and further discloses wherein calculating a trajectory of an object further comprises tracking its motion from frame to frame, which reads on "tracking said objects in multiple frames", as disclosed at column 9 lines 12-38 and column 10 lines 25-40. Schatz does not specifically disclose measuring a height of the 3D features relative to the ground plane, however, the examiner takes OFFICIAL NOTICE (see MPEP 2144.03) that it was extremely well known in the art to calculate the height of 3D features which is suggested by Schatz because the 3D features comprise position data, which reads on "measuring a height of said feature relative to a ground plane", and it would therefore be obvious to modify Schatz by providing for measuring a height of the 3D features relative to the ground plane for the purpose of filtering out 3D features based on their height.

7. Claims 2, 3, 9, 12, and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Schatz in view of Dhond et al. ("Structure from Stereo - A Review"), hereinafter referenced as Dhond.

Regarding **claim 2**, Schatz discloses everything as applied above (see claim 1). Schatz further discloses where the 3D features are derived by a well-known edge segmentation process, as disclosed at column 7 lines 38-44. However, Schatz fails to specifically disclose the details of computing the 3D features. However, the examiner maintains that it was well known in the art to provide calculating 3D features by edge-processing a stereo image to generate a plurality of

connected edges, identifying connected edges having length greater than a predetermined threshold as features, matching features to generate disparities generated from different images in an image set, and computing 3D locations of feature points according to the disparities and camera geometry, as taught by Dhond.

In the same field of endeavor, Dhond discloses 3D feature calculating methods comprising edge-processing a stereo image to generate a plurality of chained together edges, wherein it is well known to filter out edges based on length for the purpose of decreasing noise, as disclosed at page 1490, and further discloses matching features to generate disparities generated from different images in said image set, and computing 3D locations of feature points according to said disparities and camera geometry, as disclosed at page 1492 column 1, which reads on "edge-processing said stereo image to generate a plurality of connected edgelets; identifying connected edgelets having length greater than a predetermined threshold as features; matching features to generate disparities generated from different images in said image set; and computing 3D locations of feature points according to said disparities and camera geometry".

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to modify Schatz by providing identifying connected edges, from the set of edges (3D features) acquired by Schatz, having length greater than a predetermined threshold as features, matching features to generate disparities generated from different images in said image set, and computing 3D locations of feature points according to said disparities and camera geometry, as taught by Dhond, for the purpose of accurately locating 3D objects using a stereo camera.

Regarding **claim 3**, Schatz and Dhond disclose everything as applied above (see claim 2). Dhond further discloses applying stereo techniques to trinocular stereo comprising generating

depth maps and therefore disparities, since depth is calculated from disparity, from a horizontal depth map and a vertical depth map, which reads on "merging horizontal and vertical disparities to form a set of selected disparities", as disclosed at page 1503.

Regarding **claim 9**, Schatz and Dhond disclose everything as applied above (see claim 3). Schatz and Dhond fail to specifically give orientation ranges for selecting a horizontal disparity or vertical disparity of a feature. However, the examiner takes OFFICIAL NOTICE (see MPEP 2144.03) that it was extremely well known in the art to provide orientation ranges for selecting a horizontal disparity or vertical disparity when merging two disparity images in Trinocular Stereo, wherein it would be obvious to use the ranges as claimed, since the applicant does not disclose any distinct benefit of the particular ranges as claimed. Therefore it would have been obvious to modify Schatz and Dhond by providing orientation ranges for selecting a horizontal disparity or vertical disparity when merging two disparity images in Trinocular Stereo, wherein horizontal disparity is selected if the orientation of the feature is between 45 and 135 degrees or 225 and 315 degrees and wherein vertical disparity is selected otherwise, which reads on "merging step includes the steps of multiplexing said disparities by: selecting said horizontal disparities to be passed along if an orientation of said feature is between 45 and 135 or between 225 and 315; and selecting said vertical disparities to be passed along if said orientation of said feature is not between 45 and 135 or between 225 and 315", for the purpose of improving object depth measurements by using trinocular stereo.

Regarding **claim 12**, it is interpreted and thus rejected for the same reasons as applied above in the rejection of claim 2, because in order to match features to generate disparities as disclosed in claim 2, a rectification process must be performed between a left image and a right

image, wherein then the resulting disparity image is obtained and the features are found within the disparity image thus giving sparsified (features) disparities.

Regarding **claim 17**, Schatz discloses everything as applied above in the rejection of claim 1. Schatz further discloses capturing a plurality of 3D images including a reference image, and tracking an object in a plurality of images, thereby creating a trajectory, wherein the scene is monitored using the trajectory, as disclosed at column 6 line 39 - column 7 line 3 and column 10 lines 25-40. However, Schatz fails to specifically disclose a disparity map, however since Schatz discloses tracking an object wherein the object is specified by a location including a depth value, it would be obvious for Schatz to use a disparity map in order to calculate a 3D depth value for an object, as taught by Dhond.

In the same field of endeavor, Dhond discloses where the disparity obtained by computing the relative displacement of the matching feature points in the two images in a stereo image is used to extract the 3D depth of the point.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to modify Schatz by using a disparity map for the purpose of consolidating disparity values used in the object depth calculation.

8. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Schatz in view of Dhond further in view of Admitted Prior Art (page 9 lines 21-25 of the specification), hereinafter referenced as Admitted.

Regarding **claim 5**, Schatz and Dhond disclose everything as applied above (see claim 2). However, Schatz and Dhond fail to specifically disclose detecting features by performing a parabolic smoothing step, a non-integral sub-sampling step at a predefined granularity, a sobel

edge detection step, a true peak detection step, and a chaining step. However, the examiner maintains that it was well known in the art to provide detecting features by performing a parabolic smoothing step, a non-integral sub-sampling step at a predefined granularity, a sobel edge detection step, a true peak detection step, and a chaining step, as taught by Admitted at page 9 lines 21-25.

Therefore, it would have been obvious to one of ordinary skill in the art to modify Schatz by providing detecting features by performing a parabolic smoothing step, a non-integral sub-sampling step at a predefined granularity, a sobel edge detection step, a true peak detection step, and a chaining step, as taught by Admitted, for the purpose of improving feature detection by finding edges more accurately.

9. Claims 6, 7, and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Schatz in view of Dhond further in view of Pollard et al. ("PMF: A Stereo Correspondence Algorithm Using a Disparity Gradient Limit"), hereinafter referenced as Pollard.

Regarding **claim 6**, Schatz and Dhond disclose everything as applied above (see claim 2). Dhond discloses as discussed above, matching features from a first image to a second image to identify disparities. Dhond further discloses constraining an initial set of possible matches of said disparities for each feature using an epipolar constraint, as disclosed at page 1491 section B. However, Schatz and Dhond fail to specifically disclose characterizing each of the possible matches by an initial strength of match, by comparing the strength and orientation of the edges, and enforcing a smoothness constraint within a pre-selected allowable disparity gradient. However, the examiner maintains that it was well known in the art to provide for characterizing each of the possible matches by an initial strength of match, by comparing the strength and

orientation of the edges, and enforcing a smoothness constraint within a pre-selected allowable disparity gradient, as taught by Pollard.

In the same field of endeavor, Pollard discloses a PMF stereo correspondence algorithm comprising applying an epipolar constraint, characterizing each of the possible matches, between a left and a right image, by an initial strength match strength by comparing edges, and enforcing a smoothness constraint within a pre-selected allowable disparity gradient, as disclosed at page 453-455, which reads on "characterizing each of said possible matches by an initial strength of match (SOM), by comparing the strength and orientation of said edgelets; and enforcing a smoothness constraint within a pre-selected allowable disparity gradient".

Therefore it would have been obvious to one of ordinary skill in the art to modify Schatz and Dhond by providing characterizing each of the possible matches by an initial strength of match, by comparing the strength and orientation of the edges, and enforcing a smoothness constraint within a pre-selected allowable disparity gradient as taught by Pollard for the purpose of solving the stereo correspondence problem, improving the accuracy of the matching, and reducing computational cost by using a simple algorithm.

Regarding **claim** 7, Schatz, Dhond, and Pollard disclose everything as applied above (see claim 6). Pollard further discloses updating the match strength of each correspondence, comparing correspondences neighboring features under consideration, and enforcing uniqueness by iteratively identifying matches having a maximum matching strength for both of its constituent features and eliminating all other matches associated with each constituent of the identified match, as disclosed at page 454-455.

Regarding **claim 8**, Schatz, Dhond, and Pollard disclose everything as applied above (see claim 6). Dhond further discloses wherein features from the right and left images are merged to identify horizontal depth and therefore disparities, and further matching features from the left image to a top image to identify vertical depth and therefore disparities, as disclosed at page 1503 column 2, which reads on "wherein features from said right and left images are merged to identify horizontal disparities; and further matching features from a either said right or left image to a top image to identify vertical disparities".

10. Claims 4, 11, and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Schatz in view of Burschka at al. ("Scene Classification from Dense Disparity Maps in Indoor Environments"), hereinafter referenced as Burschka.

Regarding **claim 4**, Schatz discloses everything as applied above (see claim 1). As discussed above in the rejection of claim 16, Schatz discloses clustering 3D features into cluster-clouds in order to segment distinct 3D objects. However, Schatz fails to specifically disclose filtering ground plane noise from the objects. However, the examiner maintains that it was well known in the art to filter ground plane noise from an object, as taught by Burschka.

In the same field of endeavor, Burschka discloses a method for generating a 3D model of a scene using a stereo camera system comprising segmenting foreground objects from the background, wherein the background comprises a ground plane, by removing disparities corresponding to the ground plane from the disparity map, thereby segmenting out noise caused by shadows or objects on the ground, as disclosed at section 3 and section 4.1, which reads on "wherein said set of filtered 3D features are generated by filtering ground plane noise from said objects".

Therefore, it would have been obvious to one of ordinary skill in the art to modify Schatz by filtering ground plane noise from the objects, as taught by Burschka, for the purpose of not detecting shadows as moving objects.

Regarding **claim 11**, Schatz and Burschka disclose everything as applied above (see claim 4). Although Schatz and Burschka each disclose a segmenting step for segmenting objects in a 3D image, they fail to specifically disclose selecting objects wherein a 2D distance between the objects exceeds a preset threshold. However, the examiner takes OFFICIAL NOTICE (see MPEP 2144.03) that it was extremely well known in the art to select objects wherein a 2D distance between the objects exceeds a preset threshold. Therefore, it would have been obvious to modify the segmenting step of Schatz and Burschka by selecting objects wherein a 2D distance between the objects exceeds a preset threshold, for the purpose of locating objects that are truly distinct.

Regarding **claim 15**, it is interpreted and thus rejected for the same reasons as applied above in the rejection of claims 1 and 4.

11. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Schatz in view of Burschka further in view of Weng ("Agglomerative Clustering Algorithm").

Regarding **claim 10**, Schatz and Burschka disclose everything as applied above (see claim 4). However, they fail to specifically disclose breaking chains of features into contiguous segments based on abrupt changes in z between successive points. However, the examiner takes OFFICIAL NOTICE (see MPEP 2144.03) that it was extremely well known in the art to break edges into separate objects based on depth values. Therefore it would have been obvious to modify Schatz and Burschka by providing breaking chains of features into contiguous segments

based on abrupt changes in z between successive points, for the purpose of separating objects that are located at different depths within a scene, since edges are initially located in only two dimensions.

However, Schatz and Burschka further fail to disclose merging the two closest clusters based on a minimum distance criterion. However, the examiner maintains that it was well known in the art to merge two closest clusters based on a minimum distance criterion, as taught by Weng.

In the same field of endeavor Weng discloses an agglomerative clustering algorithm comprising choosing two clusters with the smallest distance and replacing these two clusters with a new cluster formed by merging the original two clusters, which reads on "merging two closest clusters based on a minimum distance criteria".

Therefore it would have been obvious to one of ordinary skill in the art to modify Schatz and Burschka, by providing for merging the two closest clusters based on a minimum distance criterion, for the purpose of reducing noise in the clustering step.

12. Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Schatz in view of Michael et al. (US Patent No 6,173,070), hereinafter referenced as Michael.

Regarding **claim 13**, Schatz discloses everything as applied above (see claim 1). However, Schatz fails to specifically disclose converting 3D features to a ground plane coordinate system, eliminating features having insufficient distance from the ground plane, projecting remaining features onto the ground plane, converting the projected features to a 2D image, generating distinct regions, scoring features in the distinct regions, and comparing the region scores to a threshold to determine if an object is present or absent. However, the

examiner maintains that it was well known in the art to provide converting 3D features to a ground plane coordinate system, eliminating features having insufficient distance from the ground plane, projecting remaining features onto the ground plane, converting the projected features to a 2D image, generating distinct regions, scoring features in the distinct regions, and comparing the region scores to a threshold to determine if an object is present or absent, as taught by Michael.

In the same field of endeavor, Michael discloses a method for finding features in a 3D stereo image comprising estimating a ground plane in a scene, calculating height of a feature relative to the ground plane, eliminating features less than a threshold away from the ground plane, projecting features onto the ground plane, thereby acquiring a 2D image, breaking the scene into a plurality of windows and determining for each window if features in the window are ball data points or non-ball data points based on a score calculated from the features in the window, as disclosed at column 9 lines 19-50, which reads on "converting said 3D features to a ground plane coordinate system; eliminating features having excessive or insufficient range, excessive lateral distance, excessive height, or insufficient distance from said ground plane; projecting remaining features into said ground plane to generate projected features; converting said projected features to a 2D image; obtaining distinct regions wherein each pixel represents a plurality of feature points; scoring features in said distinct region using a scoring function to generate region scores; accumulating said region scores and comparing said accumulated scores to a predetermined threshold to determine if an object is present or absent".

Therefore it would have been obvious to one of ordinary skill in the art to modify Schatz by providing converting 3D features to a ground plane coordinate system, eliminating features

having insufficient distance from the ground plane, projecting remaining features onto the ground plane, converting the projected features to a 2D image, generating distinct regions, scoring features in the distinct regions, comparing the region scores to a threshold to determine if an object is present or absent, as taught by Michael, for the purpose of filtering out features that are close to the ground plane in order to detect only features that are important to the detection system, thereby decreasing tracking computations.

Conclusion

13. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Nichani (US Patent No 6,701,005) discloses a method for 3D object segmentation by one of the inventors of the present application. Woodfill et al. (US Patent No 6,215,898) disclose an image processing method for stereo correspondence. Hattori et al. (US Patent No 6,963,661) disclose an obstacle detection system comprising capturing a stereo image of a scene and using it for object detection, further comprising computing the height of each object relative to a ground plane, and eliminating consideration of objects less than a certain height. Bramblet et al. (US Pub No 2004/0017929) disclose a method for detecting reverse entry though a door, comprising acquiring a stereo image of a door area, processing the image in order to locate and track objects, further comprising controlling a door in response to an objects motion and trajectory. Jain et al. (Machine Vision – Chapter 11) disclose a method for stereo imaging comprising matching features from the two images in a stereo image in order to generate disparities and computing 3D locations of points based on the disparities and camera geometry, wherein depth of a point in a scene is specifically calculated from the disparity between that

point in the two images, the distance between the two camera lens centers, and the focal length. Harville (US Patent No. 7,003,136) discloses a method for object tracking comprising generating a 3D point cloud of an object and mapping the point cloud to one or more plan-view images, wherein each plan-view image contains a plurality of vertical oriented bins.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jordan Kuhn whose telephone number is 571-272-4295. The examiner can normally be reached on M-F 8:00AM-4:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Joseph Mancuso can be reached on 571-272-7695. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Jordan Kuhn
Examiner
Art Unit 2624

JOSEPH MANCUSO
SUPERVISORY PATENT EXAMINER